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AFTER FINAL - APPEAL BRIEF

Fax Cover Sheet

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Paper No. 24

Appellant's Brief

Application No.: 09/309,844

Filed: May 11, 1999

Docket No.: ~~86-753.1~~ 96-753.1

Art Unit: 3619

Examiner: J. Restifo

TWO COPIES OF PREVIOUSLY SUBMITTED BRIEF TO SATISFY TRIPLICATE REQUIREMENT FOR BRIEF SUBMISSIONS.

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF APPEALS AND PATENT INTERFERENCES

In re Application of

William Pack

Application No. 09/309,844

Filed: May 11, 1999

For: MOUNTING ARRANGEMENT FOR A RADIATOR ASSEMBLY OF A WORK MACHINE

Attorney Docket No. 96-753.1

Art Unit: 3619

Examiner: J Restifo

Paper No. 23

June 4, 2003

Official

Assistant Commissioner for Patents
Washington, D.C. 20231

SUBMISSION OF APPELLANT'S BRIEF

FAX RECEIVED

JUN 0 5 2003

GROUP 3600

Sir:

CERTIFICATE OF FACSIMILE TRANSMISSION

I hereby certify that this correspondence was transmitted by facsimile to the U.S. Patent and Trademark Office, Facsimile No. (703) 872-9327, on June 4, 2003.

Name: John Cheek

Date: 4 June 2003

Signature: John Cheek

Submitted herewith is an Appellant's Brief together with a fee transmittal sheet. Please charge any fees associated with timely submission of this Appellant's Brief to deposit account 03-1129. In the event that this Appellant's Brief is not considered timely filed on June 4, 2003, appellant's request a one month extension of time pursuant to 37 CFR §1.36(a) and the associated fee may be charge to deposit account 03-1129.

This Brief is not submitted in triplicate with this paper due to facsimile filing. Two additional copies of the brief will be submitted by facsimile under separate cover.

Respectfully submitted,

John J. Cheek
Caterpillar Inc.
Registration No. 39,628

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Facsimile + 44 1733 58 3771

PTO/SB/17 (05-03)
Approved for use through 04/30/2003. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

FEE TRANSMITTAL for FY 2003

Effective 01/01/2003. Patent fees are subject to annual revision.

☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT ($) 320.00

Complete if Known	
Application Number	09/309,844
Filing Date	
First Named Inventor	PACK
Examiner Name	Restifo, J
Art Unit	
Attorney Docket No.	46-753.1

METHOD OF PAYMENT (check all that apply)

☐ Check ☐ Credit card ☐ Money Order ☐ Other ☐ None

☒ Deposit Account:

Deposit Account Number: 03-1129

Deposit Account Name: Caterpillar Inc.

The Director is authorized to: (check all that apply)

☒ Charge fee(s) indicated below ☐ Credit any overpayments

☐ Charge any additional fee(s) during the pendency of this application

☐ Charge fee(s) indicated below, except for the filing fee to the above-identified deposit account.

FEE CALCULATION

1. BASIC FILING FEE

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
1001	750	2001	375	Utility filing fee	
1002	330	2002	165	Design filing fee	
1003	520	2003	260	Plant filing fee	
1004	750	2004	375	Reissue filing fee	
1005	160	2005	80	Provisional filing fee	

SUBTOTAL (1) ($) —

2. EXTRA CLAIM FEES FOR UTILITY AND REISSUE

	Extra Claims		Fee from below	Fee Paid
Total Claims		-20** =		X =
Independent Claims		- 3** =		X =
Multiple Dependent				=

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description
1202	18	2202	9	Claims in excess of 20
1201	84	2201	42	Independent claims in excess of 3
1203	280	2203	140	Multiple dependent claim, if not paid
1204	84	2204	42	** Reissue independent claims over original patent
1205	18	2205	9	** Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) ($) —

**or number previously paid, if greater; For Reissues, see above

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
1051	130	2051	65	Surcharge - late filing fee or oath	
1052	50	2052	25	Surcharge - late provisional filing fee or cover sheet	
1053	130	1053	130	Non-English specification	
1812	2,520	1812	2,520	For filing a request for *ex parte* reexamination	
1804	920*	1804	920*	Requesting publication of SIR prior to Examiner action	
1805	1,840*	1805	1,840*	Requesting publication of SIR after Examiner action	
1251	110	2251	55	Extension for reply within first month	
1252	410	2252	205	Extension for reply within second month	
1253	930	2253	465	Extension for reply within third month	
1254	1,450	2254	725	Extension for reply within fourth month	
1255	1,970	2255	985	Extension for reply within fifth month	
1401	320	2401	160	Notice of Appeal	
1402	320	2402	160	Filing a brief in support of an appeal	320
1403	280	2403	140	Request for oral hearing	
1451	1,510	1451	1,510	Petition to institute a public use proceeding	
1452	110	2452	55	Petition to revive - unavoidable	
1453	1,300	2453	650	Petition to revive - unintentional	
1501	1,300	2501	650	Utility issue fee (or reissue)	
1502	470	2502	235	Design issue fee	
1503	630	2503	315	Plant issue fee	
1460	130	1460	130	Petitions to the Commissioner	
1807	50	1807	50	Processing fee under 37 CFR 1.17(q)	
1806	180	1806	180	Submission of Information Disclosure Stmt	
8021	40	8021	40	Recording each patent assignment per property (times number of properties)	
1809	750	2809	375	Filing a submission after final rejection (37 CFR 1.129(a))	
1810	750	2810	375	For each additional invention to be examined (37 CFR 1.129(b))	
1801	750	2801	375	Request for Continued Examination (RCE)	
1802	900	1802	900	Request for expedited examination of a design application	

Other fee (specify) _____

*Reduced by Basic Filing Fee Paid

SUBTOTAL (3) ($) 320

SUBMITTED BY				(Complete if applicable)	
Name (Print/Type)	John Cheek	Registration No. (Attorney/Agent)	39,628	Telephone	+441733584346
Signature	John Cheek			Date	4 June 2003

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This collection of information is required by 37 CFR 1.17 and 1.27. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF APPEALS AND PATENT INTERFERENCES

In re Application of	
William Pack	Art Unit: 3619
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Attorney Docket No. 96-753.1	

June 4, 2003

Assistant Commissioner for Patents
Washington, D.C. 20231

APPELLANT'S BRIEF

Sir:

CERTIFICATE OF FACSIMILE TRANSMISSION

I hereby certify that this correspondence was transmitted by facsimile to the U.S. Patent and Trademark Office, Facsimile No. (703) 872-9327, on June 4, 2003.

Name: John Cheek

Date: 4 June 2003

Signature: John Cheek

APPELLANTS' BRIEF

Sir:

Table of Contents

APPELLANT'S BRIEF

This is an appeal from the action of the examiner finally rejecting claims 2 through 9, 11 through 17, and 19 through 28 as being unpatentable under 35 U.S.C. § 103.

I. Real Party In Interest

The real party in interest is Caterpillar S.A.R.L. (formerly Caterpillar Commercial S.A.R.L.), which is a subsidiary of Caterpillar Inc.

II. Related Appeals And Interferences

There are no other appeals or interferences that will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. Status Of Claims

Claims 2 through 9, 11 through 17, and 19 through 28 are pending in this application. Original claims 1, 10, and 18 have been canceled. Claims 2 through 9, 11 through 17, and 19 through 28 stand finally rejected by the examiner as being unpatentable under 35 U.S.C. §103.

IV. Status Of Amendments

An amendment after final rejection was filed on March 17, 2003, requesting entry of new claims 29 through 32 directed to certain features invited by the examiner. The examiner refused entry of the proposed amendment because it presented additional claims without canceling a corresponding number of finally rejected claims. Appellant reiterates its request for entry of the new claims 29 through 32, either by the examiner or *sua sponte* by the Board of Patent Appeals and Interferences, on the basis that the examiner invited the amendment in the final rejection. On page 3 of the final rejection, the examiner wrote, "The examiner suggests the applicant further define that the radiator's longitudinal axis form an axis with the vehicles longitudinal axis, which may be favorable..." However, despite soliciting claim limitations as recited in proposed claims 29 through 32 so that the examiner could determine whether they are "favorable", the examiner now refuses entry and consideration of such claims.

V. Summary Of Invention

This invention relates generally to a mounting arrangement for a radiator assembly or heat exchanger for a work machine, such as an articulated dump truck (Fig. 1). The radiator assembly may be mounted rearward of an operator cab and a linear extension of an upper edge of the radiator cooling core extends along a line that intersects the longitudinal axis of the machine frame at an angle other than 90° (Fig. 3). The work machine includes an engine assembly that may include an engine fan (Figs 1 – 2). The radiator assembly may include a radiator fan positioned rearward of the cooling core (Figs. 2 – 3). The work machine may have a transmission assembly mounted to the frame that is located between the engine assembly and the radiator assembly (Fig. 1).

In another aspect, an engine assembly is mounted on the machine frame in an engine enclosure that has an upper surface extending downwardly and forwardly from an operator cab to terminate at a forward end positioned a first distance above the frame (Fig. 1). The radiator assembly is mounted to the machine frame rearward of the operator cab, and the upper edge of the radiator cooling core is positioned at a second, greater distance above the frame (Figs. 1 – 2). The cooling core may be positioned such that a linear extension of its upper edge extends a long a line that intersects the longitudinal axis of the machine at an angle other than 90° (Fig. 3). The engine enclosure may be devoid of a radiator assembly (Figs. 1 – 3).

In another aspect, the radiator assembly is mounted to the machine frame such that the cab assembly is interposed between the engine assembly and the radiator assembly (Figs. 1 –3). The cooling core is positioned relative to the longitudinal axis of the machine frame such that (i) a linear extension of said upper edge defines a line L_1, (ii) a line L_2 is defined by a lined which intersects the longitudinal axis so as to define a 90° angle α therebetween, and (iii) an angle σ is defined between the line L_1 and the line L_2, and (iv) $40.0° \leq \sigma \leq 95.0°$ (Fig. 3). The radiator assembly may be interposed between the cab assembly and a work implement coupled to the frame (Fig. 1).

The foregoing description is provided solely for purposes of this appeal without prejudice to the interpretation of the claims.

VI. Issue

The issue before the Board is whether claims 2 through 9, 11 through 17, and 19 through 28 of this application are unpatentable under 35 U.S.C. §103 over U.S. Patent No. 2,789,647 to Couse ("Couse") in view of U.S. Patent No. 4,362,208 to Hauser ("Hauser").

VII. Grouping Of Claims

For purposes of this appeal, claims 2 through 9 stand or fall together, claims 11 though 17 stand or fall together, claims 19 through 22 stand or fall together, claim 23 stands or falls alone, and claims 23 through 28 stand or fall together.

VIII. Argument

The Examiner's Rejection.

According to the examiner, Couse discloses a work vehicle that satisfies all of the claim limitation except that Couse does not disclose a radiator having a radiator fan or that the radiator is positioned at an angle less than 90 degrees. The examiner argues that Hauser discloses a work vehicle 3 comprising a radiator 1 having a radiator fan (or blower) 2 located behind a cab assembly 3 and positioned at an angle less than 90 degrees, as shown in Figure 6 of Hauser. The examiner therefore argues that it would have been obvious to one skilled in the art to have given the radiator assembly, as taught by Couse, the radiator fan and position the radiator at an angle in order to direct the exhaust in a desired direction. With respect to claims 23 and 24, the examiner argues that the vertical distances between the front hood and the frame relative to the vertical distance between the upper edge of the radiator and the frame do not appear to be critical to the function of the invention and therefore are viewed as a matter of design choice. In connection with this argument, the examiner asserts that the front hood can be made at a variety of heights without altering the function of the cooling arrangement.

Claims 2 through 9

Independent claim 2 recites, among other features, that a cooling core of a radiator assembly is positioned relative to the longitudinal axis of the machine main frame such that (i) a linear extension of the upper edge of the cooling core defines a line L_1, (ii) a line L_2 is defined by a line which intersects the longitudinal axis so as to define a 90° angle α therebetween, and (iii) an angle σ is defined between said line L_1 and said line L_2, and (iv) $40.0° \leq \sigma \leq 95.0°$. This feature is clearly not taught or suggested by Couse, Hauser, or the combination of Couse with Hauser.

The upper edge of the auxiliary radiator 19 of Couse clearly extends along a line that intersects the longitudinal axis of the Couse frame members 2 at a 90° angle. This is particular apparent from FIG. 1 of Couse, in which only the side of the radiator 19 is visible, whereas a portion of the front or rear of the radiator 19 would be visible if the angle of intersection were other than 90°.

The heat exchanger 1 of Hauser is also positioned so that a linear extension of its top edge intersects the longitudinal axis of the frame at a 90° angle. In FIGS. 1 and 2 of Hauser, for example, the heat exchanger 1 is clearly positioned so that a linear extension of its top edge intersect the longitudinal axis of the frame at a 90° angle, although the heat exchanger 1 is tilted rearwardly (see FIG. 2). A similar 90° intersection is seen in FIG. 3. The embodiment of FIGS. 4 and 5 is similar to FIGS. 1 and 2, except that the heat exchanger 1 is tilted laterally inwardly in FIGS. 4 and 5. The linear extension of the top edge of the heat exchanger in FIGS. 4 and 5 is still at a 90° angle relative to the longitudinal axis of the machine frame (if it even intersects the axis). Referring now to FIGS. 6 and 7 of Hauser, the heat exchanger 1 is positioned such a linear extension of its top edge likewise does not intersect the longitudinal axis of the machine frame at an angle other than 90°. It is also useful to note that FIG. 6 is a rear view and FIG. 7 is a top view, so the arrangement of the heat exchange shown in FIG. 6 is clearly substantially different from and does not suggest the arrangement recited in claim 2.

Neither Cous nor Hauser teaches an arrangement as recited in claim 2,

wherein an angle σ is defined between said line L_1 and said line L_2, and $40.0° \leq \sigma \leq 95.0$. Moreover, nothing in Couse or Hauser would suggest to one skilled in the art that using the claimed arrangement would be beneficial. Accordingly, the invention as recited in claim 2 would not have been obvious to one skilled in the art. In fact, one skilled in the art would not me motivated to modify Couse as suggested by the examiner because doing so would result in a drive mechanism for the Couse generator 12 position at an undesirable angle relative to the Couse drive shaft 17. Moreover, to so modify Couse as suggested by the examiner would provide no advantage in the Couse structure. Claim 2 distinguishes over the prior art and is in condition for allowance.

Claim 2 also recites additional limitations that are not taught or suggested by the prior art, especially in combination with the limitation discussed above. For example, claim 2 recites that that the work machine includes a transmission assembly mounted on the mainframe such that the transmission assembly is interposed between the engine assembly and the radiator assembly. This feature in combination with the limitation discussed in detail above is clearly not taught or suggested by the prior art relied upon by the examiner.

Claims 3 through 9 depend from claim 2 and are allowable for at least the same reasons as claim 2.

In view of the foregoing arguments, the examiner's rejection of claims 2 through 9 is improper and should be reversed.

Claims 11 through 17

Independent claim 11 recites, among other features, that a cooling core of a radiator assembly is positioned relative to the longitudinal axis of the machine main frame such that (i) a linear extension of the upper edge of the cooling core defines a line L_1, (ii) a line L_2 is defined by a line which intersects the longitudinal axis so as to define a 90° angle α therebetween, and (iii) an angle σ is defined between said line L_1 and said line L_2, and (iv) $40.0° \leq \sigma \leq 95.0°$. This features is also recited in independent claim 2 and is discussed in detail above. As explained above, this

feature is clearly not taught or suggested by Couse, Hauser, or the combination of Couse with Hauser. Accordingly, the arguments set forth above with regard to claim 2 are repeated and incorporated herein with regard to claims 11 through 17.

In addition, claim 11 recites that a cab assembly is mounted on the main frame such that the cab assembly is interposed between the engine assembly and the radiator assembly. This feature in combination with the limitation discussed in detail above is clearly not taught or suggested by the prior art relied upon by the examiner.

Claims 12 through 17 depend from claim 11 and are allowable for at least the same reasons as claim 11.

In view of the foregoing arguments, the examiner's rejection of claims 12 through 17 is improper and should be reversed.

Claims 19 through 22

Independent claim 19 recites a work machine comprising a frame having a longitudinal axis and an operator cab mounted on the frame. An engine enclosure is mounted on the frame forward of the operator cab, and **the engine enclosure is devoid of a radiator assembly** (emphasis added). An engine assembly is mounted the frame and located within the engine assembly. The engine assembly includes and engine and a fan directing cooling air over the engine. A radiator assembly is mounted to the frame rearward of the operator cab and includes a cooling core having an upper edge. **The cooling core is positioned such that a linear extension of the upper edge extends along a line that intersects the longitudinal axis of the frame at an angle other than 90°** (emphasis added).

The examiner contends that the combination of Couse with Hauser teaches the limitations of claim 19. However, the combination of Couse with Hauser does not teach or even suggest several limitations present in claim 19. For example, both Couse and Hauser teach the use of a radiator assembly located in the engine enclosure, whereas claim 19 clearly recites that the engine enclosure is devoid of a radiator assembly. Couse teaches the use of main radiator 8 located in the engine enclosure (see FIG. 1). Similar, Hauser states at column 4, line 13, that "The

internal combustion engine is associated with a cooling system which consists essentially of a heat exchanger located inside the engine compartment and not shown...". (see also claim 1 of Hauser). Nothing in Couse or Hauser would suggest to one skilled in the art to provide an engine enclosure devoid of a radiator, as recited in claim 19, since Couse and Hauser specifically teach away from the claimed arrangement. For this reason alone, nothing in the combination of Couse with Hauser teaches or suggests the invention recited in claim 19.

Independent claim 19 also recites that the radiator assembly has a cooling core positioned such that a linear extension of its upper edge extends along a line that intersects the longitudinal axis of the frame at an angle other than 90°. This is clearly not taught or suggested by Couse, Hauser, or the combination of Couse and Hauser. The upper edge of the auxiliary radiator 19 of Couse clearly extends along a line that intersects the longitudinal axis of the Couse frame members 2 at a 90° angle This is particular apparent from FIG. 1, in which only the side of the radiator 19 is visible, whereas a portion of the front or rear of the radiator 19 would be visible if the angle of intersection were other than 90°.

The heat exchanger 1 of Hauser is also positioned so that a linear extension of its top edge intersects the longitudinal axis of the frame at a 90° angle. In FIGS. 1 and 2, for example, the heat exchanger 1 is clearly positioned so that a linear extension of its top edge at best intersect the longitudinal axis of the frame at a 90° angle, although the heat exchanger is tilted rearwardly (see FIG. 2). A similar 90° intersection is seen in FIG. 3 The embodiment of FIGS. 4 and 5 are similar to FIGS. 1 and 2, except that the heat exchanger is tilted laterally inwardly in FIGS. 4 and 5. The linear extension of the top edge of the heat exchanger in FIGS. 4 and 5 still does not intersect the longitudinal axis of the frame at an angle other than 90°. Referring now to FIGS. 6 and 7 of Hauser, the heat exchanger 1 is positioned such a linear extension of its top edge likewise does not intersect the longitudinal axis of the machine frame at an angle other than 90°. Again, it is useful to note that FIG. 6 is a rear view and FIG. 7 is a top view, so the angled heat exchanger 1 in FIG. 6 is oriented substantially different that the arrangement recited in claim 19.

Neither Couse nor Hauser nor the combination of Couse and Hauser teaches or even suggests a work machine as recited in claim 1 wherein a linear extension of a top edge of a radiator cooling core intersects the longitudinal axis of the machine frame at an angle other than 90°. Therefore, for this additional reason, the examiner's rejection of claim 19 is improper and should be reversed.

Claims 20 through 22 depend from claim 19 and are considered allowable for the same reasons as claim 19.

In view of the foregoing arguments, the examiner's rejection of claims 19 through 22 is improper and should be reversed.

Claim 23

Claim 23 depends from claim 19 and recites that the engine enclosure includes an upper surface extending downwardly and forwardly from the operator cab, that the engine enclosure upper surface terminates at a forward end positioned at a first distance above the frame, and that the upper edge of the cooling core is positioned a second distance above said frame, the second distance being greater than the first distance. Claim 23 is allowable for the same reasons set forth above with regard to parent claim 19. Moreover, as explained below with regard to claims 24 through 28, the additional features recited in claim 23 are not taught or suggested by the prior art, especially in combination with the other limitations of parent claim 19. Therefore, the examiner's rejection of claim 23 is improper and should be reversed.

Claims 24 through 28

Independent claim 24 recites a work machine comprising a frame, an operator cab mounted on the frame, and an engine enclosure mounted on the frame forward of the operator cab. The engine enclosure includes an upper surface extending downwardly and forwardly from the operator cab, and the upper surface terminates at a first end positioned at a first distance above the frame. An engine assembly is mounted on the frame and located within the engine enclosure. A radiator assembly is mounted to the frame rearwardly of th operator cab and

includes a cooling core having an upper edge positioned a second distance above the frame. This second distance is greater than the first distance.

The examiner argues that all of the features of claim 24 are taught by the combination of Couse and Hauser and further that "the vertical distances between the front hood and the frame relative to the vertical distance between the upper edge of the radiator and the frame do not appear to be critical to the function of the invention and therefore are viewed as a matter of design choice". The quoted argument by examiner is a clear admission that the features of claim 24 are not taught by the combination of Couse and Hauser, and as explained will be explained below, the referenced feature of claim 24 is critical to the function of the invention of claim 24 and not a matter of design choice.

As explained in the specification, a goal of this invention (as recited in claim 24) is to allow increased radiator size to meet increased cooling demands resulting from engine emission control devices, but without negatively effecting operator visibility from the machine cab. The invention of claim 24 achieves this goal by positioning the radiator assembly rearwardly of the cab and allowing the top edge of the radiator assembly to extend above the frame a relatively larger distance. This then permits no radiator assembly or a small radiator assembly in the engine enclosure, thus permitting the use of an engine enclosure top surface having a forward end positioned at a relatively smaller distance above the frame, thereby allowing good forward visibility for the machine operator without compromising cooling capacity and, if needed, permitting improved cooling capacity. Clearly, the relative spacing of the top of the radiator and the top of the forward end of the engine enclosure top surface above the machine frame is critical to the function of the invention and is not a matter of design choice.

Because the combination of Couse and Hauser does not teach the invention as recited in claims 24 and the feature discussed above is critical to the invention and not a matter of design choice, the examiner's rejection of claim 24 is improper and should be reversed. Claims 25 through 28 depend from claim 24 are considered allowable for the at least the same reasons as claim 24.

In support of the final rejection, the examiner has stated that "simply claiming

relative heights of the front of the hood relative to the top surface of the radiator is considered a matter of design choice because the front hood can be made at a variety of heights without altering the function of the cooling arrangement and therefore is not considered critical to the invention and has been given little patentable weight". The examiner has not provided any good basis for his conclusion regarding "matter of design choice", and as will be explained below, the selection of the radiator height relative to the height of the upper surface of an engine enclosure is not a matter of design choice.

A declaration by William Pack, which was previously submitted and considered, is attached hereto for convenience. As indicated in the declaration, selection of the height of a radiator cooling core is critical to its function because cooling capacity is dependent upon cooling core size and cooling core size is dependent upon cooling core height. Thus, the examiner's statement in the Final Office Action that "the radiator could easily be lowered or raised without altering its function" in not correct. Increasingly stringent requirements for engine emissions have generally led to higher engine heat rejection requirements and increased cooling capacity requirement for work machine engines. Thus, designers have been driven to increase the size of radiator cooling cores, as by increasing the height of the core. At the same time, operators of work machines have increasingly demanded less obstruction of visibility from the operator cab of the machine, for example by any engine enclosure positioned forward of the operator cab. Accordingly, designers must make a trade-off between meeting increased cooling capacity requirements and conflicting operator visibility demands if a conventional arrangement is used in which the radiator is positioned in an engine enclosure forward of the operator cab. In work machines in which the radiator is positioned forward of the operator cab in an engine enclosure having an upper surface, increasing the height of the radiator to increase cooling capacity would increase the height of the engine enclosure upper surface, thus altering its function by undesirably decreasing visibility from the operator cab. Similarly, lowering the height of the upper surface of the ngine enclosure to improve operator visibility would require lowering the height of the radiator, thus altering the function of the radiator by

undesirably reducing its cooling capacity (unless other dimensions or features of the radiator are changed). Clearly, the relative positioning of the top edge of the radiator cooling core and the upper surface of the engine enclosure is not merely a matter of design choice. Claims 24 through 28 recite an innovative arrangement in which a radiator is positioned rearward of the operator cab with an engine enclosure forward of the cab in which the forward end of the upper surface of the engine enclosure is lower relative to the machine frame than the upper edge of the radiator cooling core. This arrangement is not taught or suggested by the art cited by the examiner.

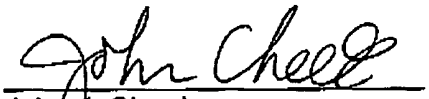
The examiner's response to the declaration and arguments presented above wasmerely to state that declaration is "directed towards the benefits of an increase in radiator size, not an increase in vertical position relative to the vehicle frame, which can be done without changing the radiator size. Although the top of the radiator cooling core arguably may be raised without changing the radiator size (e.g. by merely positioned the radiator high above the frame), one skilled in the art would have recognized at the time the invention was made that the top of the radiator cooling core cannot be lowered effectively without changing the radiator size, especially since one skilled in the art would be motivated to avoid positioning the radiator wholly or even partly below the machine frame where it could be exposed to potential damage.

In view of the foregoing arguments, the examiner's rejection of claims 24 through 28 is improper and should be reversed.

IX. Summary

For the foregoing reasons, the examiner's action in rejecting claims 2 through 9, 11 through 17, and 19 through 28 should be *reversed*. Entry of previously proposed new claims 29 through 32, either by the examiner or *sua sponte* by the Board, is requested.

Respectfully submitted,



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X. Appendix 1 - Claims On Appeal

1. CANCELED.

2. A work machine, comprising:

a main frame;

an engine assembly mounted on said main frame;

a radiator assembly mounted on said main frame; and

a transmission assembly (i) mechanically coupled to said engine assembly and (ii) mounted on said main frame such that said transmission assembly is interposed between said engine assembly and said radiator assembly;

said main frame has a longitudinal axis;

said radiator assembly includes as cooling core having an upper edge;

said cooling core is positioned relative to said longitudinal axis such that (i) a linear extension of said upper edge defines a line L_1, (ii) a line L_2 is defined by a lined which intersects said longitudinal axis so as to define a 90° angle α therebetween, and (iii) an angle σ is defined between said line L_1 and said line L_2, and (iv) $40.0° \leq \sigma \leq 95.0°$.

3. The work machine of claim 2, further comprising a cab assembly mounted on the main frame, wherein said cab assembly is interposed between said engine assembly and said radiator assembly.

4. The work machine of claim 2, further comprising:

a work implement coupled to said main frame; and

said radiator assembly is interposed between said work implement and said engine assembly.

5. The work machine of claim 4, wherein:

said work implement includes a truck bed.

6. The work machine of claim 2, wherein:

said radiator assembly include (i) a radiator fan and (ii) a cooling core; and

said cooling core is interposed between said radiator fan and said engine assembly.

7. The work machine of claim 6, further comprising an engine fan mounted on said main frame, wherein:

said engine assembly is interposed between said engine fan and said radiator fan.

8. The work machine of claim 2, further comprising:

a conduit having (i) a first end attached to said engine assembly, (ii) a second end attached to said radiator assembly, and (iii) said engine assembly is in fluid communication with said radiator assembly; and

a cooling fluid which is advanced from said radiator assembly to said engine assembly through said conduit.

9. The work machine of claim 2, further comprising:

a ground engaging mechanism mechanically coupled to said engine assembly; and

wherein actuation of said ground engaging mechanism by said engine causes said work machine to be advanced over a ground segment.

10. CANCELED

11. A work machine, comprising:

a main frame;

an engine assembly mounted on said main frame;

a radiator assembly mounted on said main frame; and

a cab assembly mounted on said main frame such that said cab assembly is interposed between said engine assembly and said radiator assembly;

said main frame having a longitudinal axis;

said radiator assembly includes a cooling core having an upper edge; and

said cooling core is positioned relative to said longitudinal axis such that (i) a linear extension of said upper edge defines a line L_1, (ii) a line L_2 is defined by a lined which intersects said longitudinal axis so as to define a 90° angle α therebetween, and (iii) an angle σ is defined between said line L_1 and said line L_2, and (iv) $40.0° \leq \sigma \leq 95.0°$.

12. The work machine of claim 11, further comprising:

a work implement coupled to said main frame; and

said radiator assembly is interposed between said work implement and said cab assembly.

13. The work machine of claim 12, wherein:

said work implement includes a truck bed.

14. The work machine of claim 11, wherein:

said radiator assembly includes (i) a radiator fan and (ii) a cooling core; and

said cooling core is interposed between said radiator fan and said cab assembly.

15. The work machine of claim 14, further comprising:

an engine fan assembly mounted on said main frame such that said engine assembly is interposed between said engine fan and said radiator fan.

16. The work machine of claim 11, further comprising:

a conduit having (i) a first end attached to said engine assembly, (ii) a second end attached to said radiator assembly, and (iii) said engine assembly is in fluid communication with said radiator assembly; and

a cooling fluid which is advanced from said radiator assembly to said engine assembly through said conduit.

17. The work machine of claim 11, further comprising:

a ground engaging mechanism mechanically coupled to said engine assembly; and

wherein actuation of said ground engaging mechanism by said engine causes said work machine to be advanced over a ground segment.

18. CANCELED

19. A work machine, comprising:

a frame having a longitudinal axis;

an operator cab mounted on said frame;

an engine enclosure mounted on said frame forward of said operator cab, said engine enclosure being devoid of a radiator assembly;

an engine assembly mounted on said frame and located within said engine enclosure, said engine assembly including an engine and an engine fan directing cooling air over said engine; and

a radiator assembly mounted to said frame rearward of said operator cab, said radiator assembly including a cooling core having an upper edge, said cooling core being positioned such that a linear extension of said upper edge extends along a line that intersects the longitudinal axis of said frame at an angle other than 90°.

20. The work machine of claim 19 wherein said radiator assembly includes a radiator fan positioned rearward of said cooling core.

21. The work machine of claim 20 wherein said radiator fan is operable to drawing air through said radiator assembly and away from said operator cab.

22. The work machine of claim 19, further comprising:

a transmission assembly mounted on said frame and operably connected with said engine assembly, said transmission assembly being located between said engine assembly and said radiator assembly.

23. The work machine of claim 19 wherein said engine enclosure includes an upper surface extending downwardly and forwardly from said operator cab, said engine enclosure upper surface terminating at a forward end positioned at a first distance above said frame, and wherein the upper edge of said cooling core is positioned a second distance above said frame, said second distance being greater than said first distance.

24. A work machine, comprising:

a frame;

an operator cab mounted on said frame;

an engine enclosure mounted on said frame forward of said operator cab, said engine enclosure including an upper surface extending downwardly and forwardly from said operator cab, said engine enclosure upper surface terminating at a forward end positioned at a first distance above said frame;

an engine assembly mounted on said frame and located within said engine enclosure; and

a radiator assembly mounted to said frame rearward of said operator cab, said assembly including a cooling core having an upper edge positioned a second distance above said frame, said second distance being greater than said first distance.

25. The work machine of claim 24 wherein said engine assembly includes an engine and an engine fan directing cooling air over said engine.

26. The work machine of claim 24 wherein said frame has a longitudinal axis, and wherein said cooling core is positioned such that a linear extension of said upper edge extends along a line that intersects the longitudinal axis of said frame at an angle other than 90°.

27. The work machine of claim 24 wherein said engine enclosure is devoid of a radiator assembly.

28. The work machine of claim 24 further comprising:

a transmission assembly mounted on said frame and operably connected with said engine assembly, said transmission assembly being located between said engine assembly and said radiator assembly.

Application No. 09/309,844
Attorney Docket No. 96-753.1

DECLARATION OF WILLIAM PACK

I, William Pack, hereby declare that:

1. I am the William Pack named as inventor in this patent application.

2. I am employed by Caterpillar Peterlee Limited as an Engineering Manager, and I have worked in the field of work machines (such as articulated truck for example) since at least as early as 1973.

3. I received a Certificate in Mechanical Engineering from Rutherford College of Advanced Technology, United Kingdom (now University of Northumbria) in 1968.

4. Selection of the height of the cooling core of a radiator or heat exchanger ("radiator") for an engine of a work machine (such as an articulated truck for example) is critical to its function since the cooling capacity of the radiator is generally dependent upon the size of radiator and the size is dependent upon the height of the radiator.

5. Increasingly stringent requirements for engine emissions have generally led to higher engine heat rejection requirements and increased cooling capacity requirement for work machine engines.

6. Operators of work machines (such as articulated trucks for example) increasingly demand less obstruction of visibility from the operator cab of the machine, for example by any engine enclosure positioned forward of the operator cab.

7. In work machines in which the radiator is positioned forward of the operator cab in an engine enclosure having an upper surface, increasing the height of the radiator to increase cooling capacity would increase the height of the engine enclosure upper surface, thus altering its function by undesirably decreasing visibility from the operator cab.

8. In a work machine as described in paragraph 7, lowering the height of the upper surface of the engine enclosure to improve operator visibility would require lowering the height of the radiator, thus altering the function of the radiator by undesirably reducing its cooling capacity (unless other dimensions or features of the radiator are changed).

9. All statements made of my own knowledge are true, and all statements made on information and belief are believed to be true.

10. I have been warned the willful false statements and the like are punishable by fine or imprisonment, or both (35 U.S.C. §1001) and may be jeopardize the validity of this application or any patent issuing thereon.

William Pack

17 MAR '03
Date

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF APPEALS AND PATENT INTERFERENCES

#25 Appeal Brief 6-6-03 RW

In re Application of

William Pack

Application No. 09/309,844

Filed: May 11, 1999

For: MOUNTING ARRANGEMENT FOR A RADIATOR ASSEMBLY OF A WORK MACHINE

Attorney Docket No. 96-753.1

Art Unit: 3619

Examiner: J Restifo

Paper No. 24

June 4, 2003

Assistant Commissioner for Patents
Washington, D.C. 20231

APPELLANT'S BRIEF

Sir:

CERTIFICATE OF FACSIMILE TRANSMISSION

06/16/2003 VWILLIAM 00000004 031129 09309844
01 FC:1402 320.00 DA

I hereby certify that this correspondence was transmitted by facsimile to the U.S. Patent and Trademark Office, Facsimile No. (703) 872-9327, on June 4, 2003.

Name: John Cheek

Date: 4 June 2003

Signature: John Cheek

APPELLANTS' BRIEF

Sir:

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APPELLANT'S BRIEF

This is an appeal from the action of the examiner finally rejecting claims 2 through 9, 11 through 17, and 19 through 28 as being unpatentable under 35 U.S.C. § 103.

I. Real Party In Interest

The real party in interest is Caterpillar S.A.R.L. (formerly Caterpillar Commercial S.A.R.L.), which is a subsidiary of Caterpillar Inc.

II. Related Appeals And Interferences

There are no other appeals or interferences that will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. Status Of Claims

Claims 2 through 9, 11 through 17, and 19 through 28 are pending in this application. Original claims 1, 10, and 18 have been canceled. Claims 2 through 9, 11 through 17, and 19 through 28 stand finally rejected by the examiner as being unpatentable under 35 U.S.C. §103.

IV. Status Of Amendments

An amendment after final rejection was filed on March 17, 2003, requesting entry of new claims 29 through 32 directed to certain features invited by the examiner. The examiner refused entry of the proposed amendment because it presented additional claims without canceling a corresponding number of finally rejected claims. Appellant reiterates its request for entry of the new claims 29 through 32, either by the examiner or *sua sponte* by the Board of Patent Appeals and Interferences, on the basis that the examiner invited the amendment in the final rejection. On page 3 of the final rejection, the examiner wrote, "The examiner suggests the applicant further define that the radiator's longitudinal axis form an axis with the vehicles longitudinal axis, which may be favorable..." However, despite soliciting claim limitations as recited in proposed claims 29 through 32 so that the examiner could determine whether they are "favorable", the examiner now refuses entry and consideration of such claims.

V. Summary Of Invention

This invention relates generally to a mounting arrangement for a radiator assembly or heat exchanger for a work machine, such as an articulated dump truck (Fig. 1). The radiator assembly may be mounted rearward of an operator cab and a linear extension of an upper edge of the radiator cooling core extends along a line that intersects the longitudinal axis of the machine frame at an angle other than 90° (Fig. 3). The work machine includes an engine assembly that may include an engine fan (Figs 1 – 2). The radiator assembly may include a radiator fan positioned rearward of the cooling core (Figs. 2 – 3). The work machine may have a transmission assembly mounted to the frame that is located between the engine assembly and the radiator assembly (Fig. 1).

In another aspect, an engine assembly is mounted on the machine frame in an engine enclosure that has an upper surface extending downwardly and forwardly from an operator cab to terminate at a forward end positioned a first distance above the frame (Fig. 1). The radiator assembly is mounted to the machine frame rearward of the operator cab, and the upper edge of the radiator cooling core is positioned at a second, greater distance above the frame (Figs. 1 – 2). The cooling core may be positioned such that a linear extension of its upper edge extends a long a line that intersects the longitudinal axis of the machine at an angle other than 90° (Fig. 3). The engine enclosure may be devoid of a radiator assembly (Figs. 1 – 3).

In another aspect, the radiator assembly is mounted to the machine frame such that the cab assembly is interposed between the engine assembly and the radiator assembly (Figs. 1 –3). The cooling core is positioned relative to the longitudinal axis of the machine frame such that (i) a linear extension of said upper edge defines a line L_1, (ii) a line L_2 is defined by a lined which intersects the longitudinal axis so as to define a 90° angle α therebetween, and (iii) an angle σ is defined between the line L_1 and the line L_2, and (iv) $40.0° \leq \sigma \leq 95.0°$ (Fig. 3). The radiator assembly may be interposed between the cab assembly and a work implement coupled to the frame (Fig. 1).

The foregoing description is provided solely for purposes of this appeal without prejudice to the interpretation of the claims.

VI. Issue

The issue before the Board is whether claims 2 through 9, 11 through 17, and 19 through 28 of this application are unpatentable under 35 U.S.C. §103 over U.S. Patent No. 2,789,647 to Couse ("Couse") in view of U.S. Patent No. 4,362,208 to Hauser ("Hauser").

VII. Grouping Of Claims

For purposes of this appeal, claims 2 through 9 stand or fall together, claims 11 though 17 stand or fall together, claims 19 through 22 stand or fall together, claim 23 stands or falls alone, and claims 23 through 28 stand or fall together.

VIII. Argument

The Examiner's Rejection.

According to the examiner, Couse discloses a work vehicle that satisfies all of the claim limitation except that Couse does not disclose a radiator having a radiator fan or that the radiator is positioned at an angle less than 90 degrees. The examiner argues that Hauser discloses a work vehicle 3 comprising a radiator 1 having a radiator fan (or blower) 2 located behind a cab assembly 3 and positioned at an angle less than 90 degrees, as shown in Figure 6 of Hauser. The examiner therefore argues that it would have been obvious to one skilled in the art to have given the radiator assembly, as taught by Couse, the radiator fan and position the radiator at an angle in order to direct the exhaust in a desired direction. With respect to claims 23 and 24, the examiner argues that the vertical distances between the front hood and the frame relative to the vertical distance between the upper edge of the radiator and the frame do not appear to be critical to the function of the invention and therefore are viewed as a matter of design choice. In connection with this argument, the examiner asserts that the front hood can be made at a variety of heights without altering the function of the cooling arrangement.

Claims 2 through 9

Independent claim 2 recites, among other features, that a cooling core of a radiator assembly is positioned relative to the longitudinal axis of the machine main frame such that (i) a linear extension of the upper edge of the cooling core defines a line L_1, (ii) a line L_2 is defined by a line which intersects the longitudinal axis so as to define a 90° angle α therebetween, and (iii) an angle σ is defined between said line L_1 and said line L_2, and (iv) $40.0° \leq \sigma \leq 95.0°$. This feature is clearly not taught or suggested by Couse, Hauser, or the combination of Couse with Hauser.

The upper edge of the auxiliary radiator 19 of Couse clearly extends along a line that intersects the longitudinal axis of the Couse frame members 2 at a 90° angle. This is particular apparent from FIG. 1 of Couse, in which only the side of the radiator 19 is visible, whereas a portion of the front or rear of the radiator 19 would be visible if the angle of intersection were other than 90°.

The heat exchanger 1 of Hauser is also positioned so that a linear extension of its top edge intersects the longitudinal axis of the frame at a 90° angle. In FIGS. 1 and 2 of Hauser, for example, the heat exchanger 1 is clearly positioned so that a linear extension of its top edge intersect the longitudinal axis of the frame at a 90° angle, although the heat exchanger 1 is tilted rearwardly (see FIG. 2). A similar 90° intersection is seen in FIG. 3. The embodiment of FIGS. 4 and 5 is similar to FIGS. 1 and 2, except that the heat exchanger 1 is tilted laterally inwardly in FIGS. 4 and 5. The linear extension of the top edge of the heat exchanger in FIGS. 4 and 5 is still at a 90° angle relative to the longitudinal axis of the machine frame (if it even intersects the axis). Referring now to FIGS. 6 and 7 of Hauser, the heat exchanger 1 is positioned such a linear extension of its top edge likewise does not intersect the longitudinal axis of the machine frame at an angle other than 90°. It is also useful to note that FIG. 6 is a rear view and FIG. 7 is a top view, so the arrangement of the heat exchange shown in FIG. 6 is clearly substantially different from and does not suggest the arrangement recited in claim 2.

Neither Couse nor Hauser teaches an arrangement as recited in claim 2,

wherein an angle σ is defined between said line L_1 and said line L_2, and $40.0° \leq \sigma \leq 95.0$. Moreover, nothing in Couse or Hauser would suggest to one skilled in the art that using the claimed arrangement would be beneficial. Accordingly, the invention as recited in claim 2 would not have been obvious to one skilled in the art. In fact, one skilled in the art would not me motivated to modify Couse as suggested by the examiner because doing so would result in a drive mechanism for the Couse generator 12 position at an undesirable angle relative to the Couse drive shaft 17. Moreover, to so modify Couse as suggested by the examiner would provide no advantage in the Couse structure. Claim 2 distinguishes over the prior art and is in condition for allowance.

Claim 2 also recites additional limitations that are not taught or suggested by the prior art, especially in combination with the limitation discussed above. For example, claim 2 recites that that the work machine includes a transmission assembly mounted on the mainframe such that the transmission assembly is interposed between the engine assembly and the radiator assembly. This feature in combination with the limitation discussed in detail above is clearly not taught or suggested by the prior art relied upon by the examiner.

Claims 3 through 9 depend from claim 2 and are allowable for at least the same reasons as claim 2.

In view of the foregoing arguments, the examiner's rejection of claims 2 through 9 is improper and should be reversed.

Claims 11 through 17

Independent claim 11 recites, among other features, that a cooling core of a radiator assembly is positioned relative to the longitudinal axis of the machine main frame such that (i) a linear extension of the upper edge of the cooling core defines a line L_1, (ii) a line L_2 is defined by a line which intersects the longitudinal axis so as to define a 90° angle α therebetween, and (iii) an angle σ is defined between said line L_1 and said line L_2, and (iv) $40.0° \leq \sigma \leq 95.0°$. This features is also recited in independent claim 2 and is discussed in detail above. As explained above, this

feature is clearly not taught or suggested by Couse, Hauser, or the combination of Couse with Hauser. Accordingly, the arguments set forth above with regard to claim 2 are repeated and incorporated herein with regard to claims 11 through 17.

In addition, claim 11 recites that a cab assembly is mounted on the main frame such that the cab assembly is interposed between the engine assembly and the radiator assembly. This feature in combination with the limitation discussed in detail above is clearly not taught or suggested by the prior art relied upon by the examiner.

Claims 12 through 17 depend from claim 11 and are allowable for at least the same reasons as claim 11.

In view of the foregoing arguments, the examiner's rejection of claims 12 through 17 is improper and should be reversed.

Claims 19 through 22

Independent claim 19 recites a work machine comprising a frame having a longitudinal axis and an operator cab mounted on the frame. An engine enclosure is mounted on the frame forward of the operator cab, and **the engine enclosure is devoid of a radiator assembly** (emphasis added). An engine assembly is mounted the frame and located within the engine assembly. The engine assembly includes and engine and a fan directing cooling air over the engine. A radiator assembly is mounted to the frame rearward of the operator cab and includes a cooling core having an upper edge. **The cooling core is positioned such that a linear extension of the upper edge extends along a line that intersects the longitudinal axis of the frame at an angle other than 90°** (emphasis added).

The examiner contends that the combination of Couse with Hauser teaches the limitations of claim 19. However, the combination of Couse with Hauser does not teach or even suggest several limitations present in claim 19. For example, both Couse and Hauser teach the use of a radiator assembly located in the engine enclosure, whereas claim 19 clearly recites that the engine enclosure is devoid of a radiator assembly. Couse teaches the use of main radiator 8 located in the engine enclosure (see FIG. 1). Similar, Hauser states at column 4, line 13, that "The

internal combustion engine is associated with a cooling system which consists essentially of a heat exchanger located inside the engine compartment and not shown...". (see also claim 1 of Hauser). Nothing in Couse or Hauser would suggest to one skilled in the art to provide an engine enclosure devoid of a radiator, as recited in claim 19, since Couse and Hauser specifically teach away from the claimed arrangement. For this reason alone, nothing in the combination of Couse with Hauser teaches or suggests the invention recited in claim 19.

Independent claim 19 also recites that the radiator assembly has a cooling core positioned such that a linear extension of its upper edge extends along a line that intersects the longitudinal axis of the frame at an angle other than 90°. This is clearly not taught or suggested by Couse, Hauser, or the combination of Couse and Hauser. The upper edge of the auxiliary radiator 19 of Couse clearly extends along a line that intersects the longitudinal axis of the Couse frame members 2 at a 90° angle This is particular apparent from FIG. 1, in which only the side of the radiator 19 is visible, whereas a portion of the front or rear of the radiator 19 would be visible if the angle of intersection were other than 90°.

The heat exchanger 1 of Hauser is also positioned so that a linear extension of its top edge intersects the longitudinal axis of the frame at a 90° angle. In FIGS. 1 and 2, for example, the heat exchanger 1 is clearly positioned so that a linear extension of its top edge at best intersect the longitudinal axis of the frame at a 90° angle, although the heat exchanger is tilted rearwardly (see FIG. 2). A similar 90° intersection is seen in FIG. 3 The embodiment of FIGS. 4 and 5 are similar to FIGS. 1 and 2, except that the heat exchanger is tilted laterally inwardly in FIGS. 4 and 5. The linear extension of the top edge of the heat exchanger in FIGS. 4 and 5 still does not intersect the longitudinal axis of the frame at an angle other than 90°. Referring now to FIGS. 6 and 7 of Hauser, the heat exchanger 1 is positioned such a linear extension of its top edge likewise does not intersect the longitudinal axis of the machine frame at an angle other than 90°. Again, it is useful to note that FIG. 6 is a rear view and FIG. 7 is a top view, so the angled heat exchanger 1 in FIG. 6 is oriented substantially different that the arrangement recited in claim 19.

Neither Couse nor Hauser nor the combination of Couse and Hauser teaches or even suggests a work machine as recited in claim 1 wherein a linear extension of a top edge of a radiator cooling core intersects the longitudinal axis of the machine frame at an angle other than 90°. Therefore, for this additional reason, the examiner's rejection of claim 19 is improper and should be reversed.

Claims 20 through 22 depend from claim 19 and are considered allowable for the same reasons as claim 19.

In view of the foregoing arguments, the examiner's rejection of claims 19 through 22 is improper and should be reversed.

Claim 23

Claim 23 depends from claim 19 and recites that the engine enclosure includes an upper surface extending downwardly and forwardly from the operator cab, that the engine enclosure upper surface terminates at a forward end positioned at a first distance above the frame, and that the upper edge of the cooling core is positioned a second distance above said frame, the second distance being greater than the first distance. Claim 23 is allowable for the same reasons set forth above with regard to parent claim 19. Moreover, as explained below with regard to claims 24 through 28, the additional features recited in claim 23 are not taught or suggested by the prior art, especially in combination with the other limitations of parent claim 19. Therefore, the examiner's rejection of claim 23 is improper and should be reversed.

Claims 24 through 28

Independent claim 24 recites a work machine comprising a frame, an operator cab mounted on the frame, and an engine enclosure mounted on the frame forward of the operator cab. The engine enclosure includes an upper surface extending downwardly and forwardly from the operator cab, and the upper surface terminates at a first end positioned at a first distance above the frame. An engine assembly is mounted on the frame and located within the engine enclosure. A radiator assembly is mounted to the frame rearwardly of the operator cab and

includes a cooling core having an upper edge positioned a second distance above the frame. This second distance is greater than the first distance.

The examiner argues that all of the features of claim 24 are taught by the combination of Couse and Hauser and further that "the vertical distances between the front hood and the frame relative to the vertical distance between the upper edge of the radiator and the frame do not appear to be critical to the function of the invention and therefore are viewed as a matter of design choice". The quoted argument by examiner is a clear admission that the features of claim 24 are not taught by the combination of Couse and Hauser, and as explained will be explained below, the referenced feature of claim 24 is critical to the function of the invention of claim 24 and not a matter of design choice.

As explained in the specification, a goal of this invention (as recited in claim 24) is to allow increased radiator size to meet increased cooling demands resulting from engine emission control devices, but without negatively effecting operator visibility from the machine cab. The invention of claim 24 achieves this goal by positioning the radiator assembly rearwardly of the cab and allowing the top edge of the radiator assembly to extend above the frame a relatively larger distance. This then permits no radiator assembly or a small radiator assembly in the engine enclosure, thus permitting the use of an engine enclosure top surface having a forward end positioned at a relatively smaller distance above the frame, thereby allowing good forward visibility for the machine operator without compromising cooling capacity and, if needed, permitting improved cooling capacity. Clearly, the relative spacing of the top of the radiator and the top of the forward end of the engine enclosure top surface above the machine frame is critical to the function of the invention and is not a matter of design choice.

Because the combination of Couse and Hauser does not teach the invention as recited in claims 24 and the feature discussed above is critical to the invention and not a matter of design choice, the examiner's rejection of claim 24 is improper and should be reversed. Claims 25 through 28 depend from claim 24 are considered allowable for the at least the same reasons as claim 24.

In support of the final rejection, the examiner has stated that "simply claiming

relative heights of the front of the hood relative to the top surface of the radiator is considered a matter of design choice because the front hood can be made at a variety of heights without altering the function of the cooling arrangement and therefore is not considered critical to the invention and has been given little patentable weight". The examiner has not provided any good basis for his conclusion regarding "matter of design choice", and as will be explained below, the selection of the radiator height relative to the height of the upper surface of an engine enclosure is not a matter of design choice.

A declaration by William Pack, which was previously submitted and considered, is attached hereto for convenience. As indicated in the declaration, selection of the height of a radiator cooling core is critical to its function because cooling capacity is dependent upon cooling core size and cooling core size is dependent upon cooling core height. Thus, the examiner's statement in the Final Office Action that "the radiator could easily be lowered or raised without altering its function" in not correct. Increasingly stringent requirements for engine emissions have generally led to higher engine heat rejection requirements and increased cooling capacity requirement for work machine engines. Thus, designers have been driven to increase the size of radiator cooling cores, as by increasing the height of the core. At the same time, operators of work machines have increasingly demanded less obstruction of visibility from the operator cab of the machine, for example by any engine enclosure positioned forward of the operator cab. Accordingly, designers must make a trade-off between meeting increased cooling capacity requirements and conflicting operator visibility demands if a conventional arrangement is used in which the radiator is positioned in an engine enclosure forward of the operator cab. In work machines in which the radiator is positioned forward of the operator cab in an engine enclosure having an upper surface, increasing the height of the radiator to increase cooling capacity would increase the height of the engine enclosure upper surface, thus altering its function by undesirably decreasing visibility from the operator cab. Similarly, lowering the height of the upper surface of the engine enclosure to improve operator visibility would require lowering the height of the radiator, thus altering the function of the radiator by

undesirably reducing its cooling capacity (unless other dimensions or features of the radiator are changed). Clearly, the relative positioning of the top edge of the radiator cooling core and the upper surface of the engine enclosure is not merely a matter of design choice. Claims 24 through 28 recite an innovative arrangement in which a radiator is positioned rearward of the operator cab with an engine enclosure forward of the cab in which the forward end of the upper surface of the engine enclosure is lower relative to the machine frame than the upper edge of the radiator cooling core. This arrangement is not taught or suggested by the art cited by the examiner.

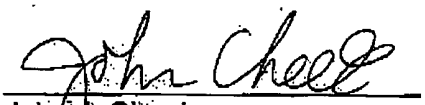
The examiner's response to the declaration and arguments presented above wasmerely to state that declaration is "directed towards the benefits of an increase in radiator size, not an increase in vertical position relative to the vehicle frame, which can be done without changing the radiator size. Although the top of the radiator cooling core arguably may be raised without changing the radiator size (e.g. by merely positioned the radiator high above the frame), one skilled in the art would have recognized at the time the invention was made that the top of the radiator cooling core cannot be lowered effectively without changing the radiator size, especially since one skilled in the art would be motivated to avoid positioning the radiator wholly or even partly below the machine frame where it could be exposed to potential damage.

In view of the foregoing arguments, the examiner's rejection of claims 24 through 28 is improper and should be reversed.

IX. Summary

For the foregoing reasons, the examiner's action in rejecting claims 2 through 9, 11 through 17, and 19 through 28 should be *reversed*. Entry of previously proposed new claims 29 through 32, either by the examiner or *sua sponte* by the Board, is requested.

Respectfully submitted,



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X. Appendix 1 - Claims On Appeal

1. CANCELED.

2. A work machine, comprising:

a main frame;

an engine assembly mounted on said main frame;

a radiator assembly mounted on said main frame; and

a transmission assembly (i) mechanically coupled to said engine assembly and (ii) mounted on said main frame such that said transmission assembly is interposed between said engine assembly and said radiator assembly;

said main frame has a longitudinal axis;

said radiator assembly includes as cooling core having an upper edge;

said cooling core is positioned relative to said longitudinal axis such that (i) a linear extension of said upper edge defines a line L_1, (ii) a line L_2 is defined by a lined which intersects said longitudinal axis so as to define a 90° angle α therebetween, and (iii) an angle σ is defined between said line L_1 and said line L_2, and (iv) $40.0° \leq \sigma \leq 95.0°$.

3. The work machine of claim 2, further comprising a cab assembly mounted on the main frame, wherein said cab assembly is interposed between said engine assembly and said radiator assembly.

4. The work machine of claim 2, further comprising:

a work implement coupled to said main frame; and

said radiator assembly is interposed between said work implement and said engine assembly.

5. The work machine of claim 4, wherein:

said work implement includes a truck bed.

6. The work machine of claim 2, wherein:

said radiator assembly include (i) a radiator fan and (ii) a cooling core; and

said cooling core is interposed between said radiator fan and said engine assembly.

7. The work machine of claim 6, further comprising an engine fan mounted on said main frame, wherein:

said engine assembly is interposed between said engine fan and said radiator fan.

8. The work machine of claim 2, further comprising:

a conduit having (i) a first end attached to said engine assembly, (ii) a second end attached to said radiator assembly, and (iii) said engine assembly is in fluid communication with said radiator assembly; and

a cooling fluid which is advanced from said radiator assembly to said engine assembly through said conduit.

9. The work machine of claim 2, further comprising:

a ground engaging mechanism mechanically coupled to said engine assembly; and

wherein actuation of said ground engaging mechanism by said engine causes said work machine to be advanced over a ground segment.

10. CANCELED

11. A work machine, comprising:

a main frame;

an engine assembly mounted on said main frame;

a radiator assembly mounted on said main frame; and

a cab assembly mounted on said main frame such that said cab assembly is interposed between said engine assembly and said radiator assembly;

said main frame having a longitudinal axis;

said radiator assembly includes a cooling core having an upper edge; and

said cooling core is positioned relative to said longitudinal axis such that (i) a linear extension of said upper edge defines a line L_1, (ii) a line L_2 is defined by a lined which intersects said longitudinal axis so as to define a 90° angle α therebetween, and (iii) an angle σ is defined between said line L_1 and said line L_2, and (iv) $40.0° \leq \sigma \leq 95.0°$.

12. The work machine of claim 11, further comprising:

a work implement coupled to said main frame; and

said radiator assembly is interposed between said work implement and said cab assembly.

13. The work machine of claim 12, wherein:

said work implement includes a truck bed.

14. The work machine of claim 11, wherein:

said radiator assembly includes (i) a radiator fan and (ii) a cooling core; and

said cooling core is interposed between said radiator fan and said cab assembly.

15. The work machine of claim 14, further comprising:

an engine fan assembly mounted on said main frame such that said engine assembly is interposed between said engine fan and said radiator fan.

16. The work machine of claim 11, further comprising:

a conduit having (i) a first end attached to said engine assembly, (ii) a second end attached to said radiator assembly, and (iii) said engine assembly is in fluid communication with said radiator assembly; and

a cooling fluid which is advanced from said radiator assembly to said engine assembly through said conduit.

17. The work machine of claim 11, further comprising:

a ground engaging mechanism mechanically coupled to said engine assembly; and

wherein actuation of said ground engaging mechanism by said engine causes said work machine to be advanced over a ground segment.

18. CANCELED

19. A work machine, comprising:

a frame having a longitudinal axis;

an operator cab mounted on said frame;

an engine enclosure mounted on said frame forward of said operator cab, said engine enclosure being devoid of a radiator assembly;

an engine assembly mounted on said frame and located within said engine enclosure, said engine assembly including an engine and an engine fan directing cooling air over said engine; and

a radiator assembly mounted to said frame rearward of said operator cab, said radiator assembly including a cooling core having an upper edge, said cooling core being positioned such that a linear extension of said upper edge extends along a line that intersects the longitudinal axis of said frame at an angle other than 90°.

20. The work machine of claim 19 wherein said radiator assembly includes a radiator fan positioned rearward of said cooling core.

21. The work machine of claim 20 wherein said radiator fan is operable to drawing air through said radiator assembly and away from said operator cab.

22. The work machine of claim 19, further comprising:

a transmission assembly mounted on said frame and operably connected with said engine assembly, said transmission assembly being located between said engine assembly and said radiator assembly.

23. The work machine of claim 19 wherein said engine enclosure includes an upper surface extending downwardly and forwardly from said operator cab, said engine enclosure upper surface terminating at a forward end positioned at a first distance above said frame, and wherein the upper edge of said cooling core is positioned a second distance above said frame, said second distance being greater than said first distance.

24. A work machine, comprising:

a frame;

an operator cab mounted on said frame;

an engine enclosure mounted on said frame forward of said operator cab, said engine enclosure including an upper surface extending downwardly and forwardly from said operator cab, said engine enclosure upper surface terminating at a forward end positioned at a first distance above said frame;

an engine assembly mounted on said frame and located within said engine enclosure; and

a radiator assembly mounted to said frame rearward of said operator cab, said assembly including a cooling core having an upper edge positioned a second distance above said frame, said second distance being greater than said first distance.

25. The work machine of claim 24 wherein said engine assembly includes an engine and an engine fan directing cooling air over said engine.

26. The work machine of claim 24 wherein said frame has a longitudinal axis, and wherein said cooling core is positioned such that a linear extension of said upper edge extends along a line that intersects the longitudinal axis of said frame at an angle other than 90°.

27. The work machine of claim 24 wherein said engine enclosure is devoid of a radiator assembly.

28. The work machine of claim 24 further comprising:

a transmission assembly mounted on said frame and operably connected with said engine assembly, said transmission assembly being located between said engine assembly and said radiator assembly.

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DECLARATION OF WILLIAM PACK

I, William Pack, hereby declare that:

1. I am the William Pack named as inventor in this patent application.

2. I am employed by Caterpillar Peterlee Limited as an Engineering Manager, and I have worked in the field of work machines (such as articulated truck for example) since at least as early as 1973.

3. I received a Certificate in Mechanical Engineering from Rutherford College of Advanced Technology, United Kingdom (now University of Northumbria) in 1968.

4. Selection of the height of the cooling core of a radiator or heat exchanger ("radiator") for an engine of a work machine (such as an articulated truck for example) is critical to its function since the cooling capacity of the radiator is generally dependent upon the size of radiator and the size is dependent upon the height of the radiator.

5. Increasingly stringent requirements for engine emissions have generally led to higher engine heat rejection requirements and increased cooling capacity requirement for work machine engines.

6. Operators of work machines (such as articulated trucks for example) increasingly demand less obstruction of visibility from the operator cab of the machine, for example by any engine enclosure positioned forward of the operator cab.

7. In work machines in which the radiator is positioned forward of the operator cab in an engine enclosure having an upper surface, increasing the height of the radiator to increase cooling capacity would increase the height of the engine enclosure upper surface, thus altering its function by undesirably decreasing visibility from the operator cab.

8. In a work machine as described in paragraph 7, lowering the height of the upper surface of the engine enclosure to improve operator visibility would require lowering the height of the radiator, thus altering the function of the radiator by undesirably reducing its cooling capacity (unless other dimensions or features of the radiator are changed).

9. All statements made of my own knowledge are true, and all statements made on information and belief are believed to be true.

10. I have been warned the willful false statements and the like are punishable by fine or imprisonment, or both (35 U.S.C. §1001) and may be jeopardize the validity of this application or any patent issuing thereon.

William Pack

17 MAR '03
Date